Diseases Caused by Oomycetes

First Report of *Pythium aphanidermatum* Causing Stalk Rot on *Abelmoschus manihot* in China

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Abelmoschus manihot (L.) Medicus is an annual to perennial herb of the Malvaceae okra, mainly distributed in Guangdong, Guangxi, Fujian, Hunan, and Hubei provinces of China. It can be used not only as an ornamental flower, but also has important economic and medicinal value. Last year, 10% of *A. manihot* in 1,000 acres were observed with stalk rot in the Zhongshang Agricultural Industrial Park, 50 meters east of Provincial Highway 235 in Gaoyang County of Hebei Province. Internal discoloration of the stem began as brown to black discoloration of the vascular system and became hollow, with the mycelium growing on the surface. Stems from symptomatic plants (approximately 5 mm²) were dissected, washed free of soil, then soaked in 75% ethanol for 16 s and in HgCl₂ for 40 s to surface-sterilize, then rinsed three times in sterile water. After being dried with blotting paper, five pieces were placed on potato dextrose agar (PDA). After culturing for 2 to 3 days, five isolates were purified and recultured on PDA in the dark at 25°C. The color of the colony was white. The hyphae were radial in PDA, and the aerial hyphae were flocculent, well-developed with luxuriant branches. The colonies were white and floccus, and the aerial hyphae were well developed, branched, and without septum on corn meal agar (CMA). The sporangia were large or petal shaped, composed of irregular hyphae, terminal or intermediate, with the size of 31.6 to 88.4 µm × 12.7 to 14.6 µm. Vesicles were spherical,

terminal, or intermediate, ranging from 14.6 to 18.5 µm. Oogonia were globose, terminal, and smooth, with a straight stipe. Antheridia were clavate or baggy and mostly intercalary, sometimes terminal. Oospores were aplerotic, 21.5 to 30.0 µm in diameter, 1.6 to 3.1 µm in wall thickness. The isolates' morphological characteristics were consistent with *Pythium aphanidermatum* (van der Plaats-Niterink 1981; Wu et al. 2021). To identify the isolates, universal primers ITS1/ITS4 (White et al. 1993) were used for PCR-based molecular identification. The amplification region was sequenced by Sangon Biotech (Shanghai, China) and submitted to GenBank (MW819983). BLAST analysis showed that the sequence was 100% identical to *P. aphanidermatum*. Pathogenicity tests were conducted three times, with four treatments and two controls each time. The plants treated were 6 months old. The hyphae growing on PDA for 7 days were cut into four pieces. Next, they were inoculated into the soil of the *A. manihot*. Negative controls were inoculated only with PDA for 7 days (Zhang and Yang 2007). The plants were then placed in a greenhouse at 28°C, 90% relative humidity. After inoculation for 20 to 30 days, the infected plants showed stalk rot, the same symptoms as observed on the original plants. Control plants had no symptoms. *P. aphanidermatum* was reisolated from infected stems and showed the same characteristics as described above and was identical in appearance to the isolates used to inoculate the plants. To our knowledge, this is the first report of *P. aphanidermatum* infecting *A. manihot* stem and causing stalk rot in China. It may become a significant problem for *A. manihot*. Preliminary management practices are needed for reducing the cost and losses of production.

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